Claim

1. A field effect transistor sandwiched organic semiconductor, comprising:

a substrate (1),

a gate electrode (2) formed on the surface of the substrate (1),

a gate insulation layer (3) formed on the substrate (1) and the gate insulation layer (2),

which is characterized in that, further comprising:

an active layer (4) formed on the gate insulation layer (3), or meanwhile leaving a part of the gate insulation layer (3) to be exposed,

a source and drain electrodes (5) formed on a part of the gate insulation layer (3) and a part of the active layer (4),

an active layer (6) formed on the exposed part of the gate insulation layer (3), the active layer (4), the source electrode and the drain electrode (5).

2. The field effect transistor according to claim 1, wherein the said active layer has holes.

3. The field effect transistor according to claim 2, wherein the said semiconductor material is organic semiconductor material or the hybridized product of organic material and inorganic material.

4. The field effect transistor according to claim 3, wherein the said organic semiconductor material is a solid-state material formed by mixing, eutecting or laminating of two or more kinds of molecular material.

5. The field effect transistor according to claim 4, wherein the said organic semiconductor material has a carrier mobility of at least $10^{-3}cm^2/V.s$.

6. The field effect transistor according to claim 1, wherein the said semiconductor material for the active layer (4) is the same as that for the active layer (6).

7. The field effect transistor according to claim 1, wherein the said semiconductor material for the active layer (4) is different from that for the active layer (6).

8. The field effect transistor according to claim 1, wherein the said semiconductor material for the active layers (4) and (6) is eutectic.

9. The field effect transistor according to claim 1, wherein the said active layers (4) and (6) are comprised of at least one selected from a group consisting of CuPc, NiPc, ZnPc, H_2Pc, TiOPc, VOPc, $F_{16}CuPc$, $F_{16}ZnPc$ and Pentacene, respeactively.

10. The field effect transistor according to claim 1, wherein the said active layer (4) is comprised of at least one selected from a group consisting of CuPc, NiPc, ZnPc, H_2Pc, $F_{16}CuPc$, $F_{16}ZnPc$ and Pentacene, and the said active layer (6) is comprised of at least one selected from a group consisting of twin-Pc metal, H_2Nc, CoNc, CuNc, ZnNc and NiNc.

11. The field effect transistor according to claim 10, wherein the said twin-Pc metal is at least one selected from a group consisting of $LaPc_2$, $CePc_2$, $PrPc_2$, $NdPc_2$, $SmPc_2$, $EuPc_2$, $GdPc_2$, $TbPc_2$, $DyPc_2$, $HoPc_2$, $ErPc_2$, $TmPc_2$, $YbPc_2$, $LuPc_2$, YPc_2, $ZrPc_2$, $HfPc_2$ and $SnPc_2$.

12. A process for producing a field effect transistor sandwiched an organic semiconductor, comprising:

a. forming a layer of conducting material on a substrate and then forming a gate electrode by the method of photolithography ;

b. forming an insulation layer on the substrate and the gate electrode;

c. vaporously depositing a semiconductor layer on a part of the insulation layer while leaving the other part of the insulation layer exposed;

d. forming a layer of conducting material on the exposed insulation layer and the semiconductor layer, and forming a source electrode and a drain electrode by the photolithography method or delaminating method;

e. vaporously depositing or spin-coating a semiconductor layer on the source electrode, the drain electrode, the exposed semiconductor layer and the exposed insulation layer.